## **TEZPUR UNIVERSITY**



Dr. Mrinal Kumar Das,
Dept. of Physics
Napaam-784028, Assam, India

Phone: +91-3712 275563 +91-9706980913(M)

 $E\text{-}mail:\ mkdas@tezu.ernet.in$ 

## **CERTIFICATE OF THE SUPERVISOR**

This is to certify that the thesis entitled "Study of Different Neutrino Mass Models in the Context of Recent Neutrino and Cosmology Data" submitted to the School of Sciences of Tezpur University in partial fulfilment for the award of the degree of Doctor of Philosophy in Physics is a record of research work carried out by Mr. Manikanta Borah under my supervision and guidance.

All help received by him from various sources have been duly acknowledged.

No part of this thesis have been submitted elsewhere for award of any other degree.

Place: Tezpur

Date:

Dr. Mrinal Kumar Das

Associate Professor
Department of Physics
School of Sciences

Tezpur University, Assam

 $Dedicated\ to$   $My\ beloved\ parents$  and  $My\ lovely\ sister$ 

DECLARATION BY THE CANDIDATE

I, Manikanta Borah, hereby declare that the subject matter in this thesis enti-

tled, "Study of Different Neutrino Mass Models in the Context of Recent

Neutrino and Cosmology Data", is the record of work done by me, that the

contents of this thesis did not form basis of the award of any previous degree to me

or to the best of my knowledge to anybody else, and that the thesis has not been

submitted by me for any research degree in any other university/institute.

This thesis is being submitted to the Tezpur University for the degree of Doctor

of Philosophy in Physics.

Place: Tezpur.

Date:

Signature of the candidate

vi

## Acknowledgements

It is a matter of immense pleasure for me to express profound sense of gratitude to my honored supervisor Dr. Mrinal Kumar Das for his dynamic and meticulous supervision, motivation and encouragement during my Ph D work. I was fortunate enough to avail all resources for his genial inspiration and enthusiastic encouragement throughout the course of my work. Without his serious involvement, thoughtfulness and patience, it would have been difficult for me to complete this thesis in time.

I am very thankfull to my collaborators Dr. Debasish Borah, Assistant Prof. of Dept of Physics, Tezpur University, Assam and Dr. Sudhanwa Patra, Assistant Prof. of Dept of Physics, Siksha 'O' Anusandhan University, Odisha for their invaluable help and encouragement during my research work.

I extend my sincere gratitude to my DRC committee members, Prof. J. K. Sarma, Department of Physics and Dr. Debasish Borah, Department of Physics for their encouragement, inspirational and fruitful discussion during my Ph D work. I am highly grateful to all the faculty members of Department of Physics for their personal involvement, timely help, stimulating discussion to carry out research. My sincere thanks to Dr. Muhidhar Pujari, Associate Prof., Dept. of Physics, North Lakhimpur College for his inspiration and suggestions.

I appreciate having capitalized on this great opportunity given to me at

Tezpur University. The facilities at Tezpur University have allowed me to enhance my experience both at academic and personal level. I had already been a student at Department of Physics, Tezpur University for M.Sc, and I deeply appreciate the constant encouragement and academic support received from all my teachers that motivated me to pursue research in Physics. I would like to acknowledge Tezpur University and UGC for providing me financial support during my research time. I appreciate the help from technical staff and office staff of Department of Physics for their timely help

My time at Tezpur University was made enjoyable in large part due to many friends that became a part of my life. Thank you Munmi, Gitu, Chandan, Gyani, Pronob da and Lachit for being there always. Special acknowledgement goes to friends and colleagues: Sibashis, Samiran, Koushik, Zakir, JB, BK, Nikhil, Pearl, Dimpal, Hari, Bhupen da, Iftak, Naba, Rupam, Dimpi, Happy, Ananya, Archana, Biswa, Mridusmita and Kakoli.

on various aspects.

No words can repay for the continuous encouragement, moral support, blessings and everything else that I received from my parents. I am short of words for expressing my gratitude to my dear sister Anju for her unconditional love. A big thanks to Munmi and Gitu for their inspiration, help and support.

Date:	(Manikanta Borah)
Place:	